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MASSAGE THERAPY STUDY

Massage therapy plus topical analgesic is more effective than massage alone for hand arthritis pain



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KEYWORDS

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Summary *Methods:* 20 adults were randomly assigned to a massage therapy or a massage therapy plus a topical analgesic application group. Both groups received a weekly massage from a therapist and were taught self-massage (same procedure) to be done by each participant once daily over a four-week period.

Results: The massage plus topical analgesic group as compared to the massage group had greater improvement in hand function as measured by a digital hand exerciser following the first session and across the four-week period. That group also had a greater increase in perceived grip strength and a greater decrease in hand pain, depressed mood and sleep disturbances over the four-week period.

Massage therapy has been effective for several pain syndromes including migraine headaches (Lawle and Cameron, 2006), lower back pain (Hsieh et al., 2004), fibromyalgia (Kalichman, 2010), neck and shoulder pain (Kong et al., 2013), carpal tunnel syndrome (Elliott and Burkett, 2013), and pain related to upper limb arthritis (Field et al., 2013). The purpose of the current study was to determine whether applying a topical analgesic following massage might be more effective than massage alone in treating pain associated with hand arthritis.

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Introduction

In an earlier study on hand arthritis, massage therapy was noted to reduce pain and enhance function (Field et al., 2007). In that study 22 adults with wrist/hand arthritis were randomly assigned to a massage therapy group or a control group that only received the assessments. The massage therapy group received massage on their affected wrist and hand once per week for a 4-week period. They were also taught to conduct a self-massage using the same protocol but to be done on those days they did not receive a massage by a therapist. The massage therapy group as compared to the control group had less pain and greater grip strength after their first and last sessions as well as lower depressed mood and anxiety scores. The increased grip strength could be related to massage therapy increasing muscle strength. It could also be related to decreased pain. Decreased anxiety and depression are typically associated with the decreased pain that occurs following massage therapy, so those effects were not surprising (see Field et al., 2007a,b for a review).

The massage therapy protocol that was effective in the Field et al. (2007a,b) hand arthritis study was used in the current study. Individuals with hand arthritis pain were randomly assigned to a massage group or a massage group plus a topical analgesic application following the massage to determine any additive effects of the topical analgesic.

Method

Participants

Twenty females with hand arthritis were recruited from a medical school faculty/staff via email announcements, and following informed consent were randomly assigned to a massage alone or a massage plus topical analgesic group. The sample size was determined by a power analysis. The women were on average 47.6 years-old, middle socioeconomic status, and 82% had a college education. Their ethnicity was distributed 48% Hispanic, 28% Black, 12% non-Hispanic white and 12% Asian. Their occupations were distributed 47% administrative, 29% academic, 18% technicians and 6% executives. The groups did not differ on these demographic variables.

Procedure

The participants in both groups were massaged on the affected wrist/hand by a massage therapist once per week for one month. They were also taught the same massage to be done by themselves daily. The participants were called at the end of each week to schedule for the following week and to check on their compliance with the daily massage sessions.

Massage therapy protocol

The 15-min massages were comprised of moderate pressure stroking focused on the fingertips to the elbow (see Table 1 for details of protocol). The massage began with stroking

the wrist up to the elbow and back down on each side of the forearm. This was followed by a wringing motion (like milking a cow) that was applied to the same area. Using the thumb and forefinger the therapist then stroked the forearm and hand in a circular or back and forth motion. Finally, the therapist rolled the skin using the thumb and forefinger moving across the hand and up each side of the forearm.

The massage plus topical analgesic group received the same massages but also had a topical analgesic gel consisting of 4% menthol (Biofreeze, Akron, Ohio) applied at the end of the sessions. They were also given packets of the topical analgesic gel to apply at the end of their self-massage sessions.

Both groups were aware of the treatment of the other group insofar as the informed consent covered the random assignment to the different type groups. The demographic questionnaire also requested self-report on the use of any topicals and any other massage or acupuncture treatments.

Pre-post session assessments

Before and after the first and last massage therapy sessions the participants were given the following assessments: 1) Grip strength as measured by a talking digital exerciser (MaxiAids); 2) Perceived grip strength as measured on a 0–10 thermometer-like scale, perceived grip strength being given to check its reliability vis a vis the digital exerciser measure; 3) Perceived pain as measured by the VITAS (a Visual Analog Scale ranging from 0 for no pain to 10 for worst possible pain anchored with 5 faces); 4) Depressed mood as measured by the Profile of Mood States (McNair et al., 1971) which is a 5-point Likert rating scale on how well an adjective describes feelings including helpless and depressed feelings. The scale has adequate internal consistency ($r = .95$) (McNair et al., 1971); and 5) Sleep disturbances as measured by the Sleep Disturbance Scale which is a 15-item measure rated on a visual analog scale anchored at one end with effective sleep responses (e.g., "Did not awaken", "Had no trouble sleeping") and at the other end with ineffective sleep (e.g., "Had a lot of trouble falling asleep"). The participant placed marks on the answer line (much like a ruler line) at the point that represents last night's sleep from, for example, no trouble sleeping to some trouble sleeping to moderate trouble to great trouble sleeping. This measure was given on the first and last day assessments. Internal consistency for this scale was adequate based on alpha coefficient of .88.

Results

Analyses of variance (group by repeated measures with pre-post massage and beginning-end of treatment days as the repeated measures) were conducted to determine. These ANOVAs were conducted to determine the group differences in the changes that occurred: 1) from pre to post the first day session; 2) from pre to post the last day session; and 3) from pre-session on the first day to pre-session on the last day. Bonferroni t tests were then conducted to determine group by session interaction effects.

Table 1 Hand pain massage protocol.

Hand pain massage

- **Stroking** – On the top of the forearm, stroke from the wrist to the elbow (applying moderate pressure) and from the elbow back to the wrist. Repeat stroking forearm 3X. On the top of the hand stroke from the wrist to the tips of the fingers and back to the wrist. Repeat stroking hand 3X. Repeat procedure on the underside of the forearm and palm of the hand.
- **Milking** – On the top of the forearm milking (much like milking a cow) by cupping your fingers on top and your thumb on underside of arm and pulling the flesh between them, gradually moving down to wrist and back up to elbow from the wrist (again applying moderate pressure). Repeat on the bottom of the forearm. For the hand, place your thumb on the top of your hand at your wrist and your index finger on the bottom of your hand and squeeze and pull to the end of each finger. Repeat on palm of hand.
- **Friction** – On the top of the forearm make circular movements with your 4 fingers moving down the forearm and then down the top of the hand. Repeat same on underside of arm and palm of hand.
- **Skin Rolling** – Similar to the milking, you squeeze the arm between the fingers and the thumb but then crawl your fingers across skin with moderate pressure first on top of forearm and then the hand. Repeat on the underside of the arm and the palm of the hand.

As can be seen in Table 2, repeated measures effects for pre-post session changes (significance levels given in column 2 for the first session and column 4 for the last session) suggested that both groups experienced significant changes in the expected direction for grip strength, perceived grip strength, pain and depressed mood following the massages. Repeated measures effects for first day versus last day measures suggested that both groups had also experienced longer-term changes in the expected direction for grip strength, perceived grip strength, pain, depressed mood and sleep disturbances. The significance levels for these effects are indicated by superscripts in column 3. Significant group by repeated measures interaction effects suggested that the massage plus topical analgesic group versus the massage alone group experienced greater changes in the expected direction from the first to the last day of treatment on grip strength ($t = 2.31, p < .01$), perceived grip strength ($t = 2.17, p < .05$), pain ($t = 2.04, p < .05$),

depressed mood ($t = 2.48, p < .01$) and sleep disturbances ($t = 2.09, P < .05$).

Discussion

The immediate increases in grip strength and perceived grip strength and the decreases in pain following the massage sessions for both groups are consistent with previous data showing similar changes following the same massage protocol used for individuals with carpal tunnel syndrome (Field et al., 2004) and with hand arthritis (Field et al., 2007). And, the reduction in depressed mood was not surprising given that depressed mood is typically alleviated along with decreased pain (Field et al., 2007 review).

The greater changes for the massage plus topical analgesic group versus the massage alone group by the end of the study are novel findings, although they may be consistent with a pilot study suggesting that applying topical herbal cream and ice have lessened pain associated with osteoarthritis of the hand and of the knee (Gemmell et al., 2003). The aroma and the cooling effect of the topical analgesic may add to the therapeutic effects of the massage. Aromas and ice have been noted to lessen pain (Gemmell et al., 2003).

Although the underlying mechanisms are not clear, moderate pressure massage has been noted to increase vagal activity (Diego et al., 2004) and serotonin levels (the body's natural pain killer) (Field et al., 2007 review). Hand massage has resulted in decreased heart rate and respiration (increased vagal activity) in at least one study (Wang and Keck, 2004). Another potential mechanism suggested by the decreased sleep disturbances in this study is that with deeper sleep, less substance P (that emits pain) was produced. In our study on fibromyalgia, we noted that less substance P was emitted following more time in deep sleep (Field et al., 2002).

Further studies are needed. For example, a three-tier study that included a control group that did not receive massage therapy and a longer-term intervention study could lead to less tenuous findings than this short-term study. In addition, future studies could assess the effects of different massage protocols that also use moderate pressure. It would also be important to explore potential

Table 2 Means for pre-post massage plus topical analgesia session measures (massage alone group means in parentheses).

| Measures | First day | | Last day | |
|-------------------------|------------|--------------------------------------|--------------------------------------|--------------------------------------|
| | Pre | Post | Pre | Post |
| Grip strength | 32 (31) | 41 ^b (38) ^a | 41 ^b (37) ^a | 49 ^b (42) ^a |
| Perceived grip strength | 6 (5) | 8 ^b (6) ^a | 8 ^b (7) ^a | 9 ^a (8) ^a |
| Hand pain | 4 (5) | 2 ^b (4) ^a | 2 ^b (4) ^a | 1 ^a (3) ^a |
| Depressed mood | 8 (7) | 6 ^b (6) ^a | 5 ^c (6) ^a | 3 ^b (5) ^a |
| Sleep disturbance | 29 (26) | | 22 ^c (21) ^b | |

Superscripts in column 2 indicate significance levels for pre-post session changes for the first day and those in column 4 indicate significance levels for pre-post session changes for the last day. Superscripts in column 3 indicate significance levels for changes from the first day to the last day.

^a $p < .05$.

^b $p < .01$.

^c $p < .005$.

underlying mechanisms for the increased grip strength and reduction in pain following massage therapy as well as those for the additive effects of the topical analgesic. Nonetheless, the current study suggests that the combination of moderate pressure massage administered by the therapist and by the participants and the application of topical analgesic following the massage may be the more effective therapy for increasing grip strength and reducing pain and the associated depressed mood and sleep disturbances in individuals with hand arthritis.

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References

- Diego, M.A., Field, T., Sanders, C., Hernandez-Reif, M., 2004. Massage therapy of moderate and light pressure and vibrator effects on EEG and heart rate. *Int. J. Neurosci.* 114, 31–45.
- Elliott, R., Burkett, B., 2013. Massage therapy as an effective treatment for carpal tunnel syndrome. *J. Bodywork Move. Ther.* 17, 332–338.
- Field, T., Diego, M., Cullen, C., Hernandez-Reif, M., Sunshine, W., Douglas, S., 2002. Fibromyalgia pain and substance P decrease and sleep improves after massage therapy. *J. Clin. Rheumatol.* 8, 72–76.
- Field, T., Diego, M., Delgado, J., Garcia, D., Funk, C.G., 2013. Rheumatoid Arthritis in upper limbs benefits from moderate pressure massage therapy. *Complement. Ther. Clin. Pract.* 19, 101–103.
- Field, T., Diego, M., Hernandez-Reif, M., 2007a. Massage therapy research. *Dev. Rev.* 27, 75–89.
- Field, T., Diego, M., Hernandez-Reif, M., Shea, J., 2007b. Hand arthritis pain reduced by massage therapy. *J. Bodywork Move. Ther.* 2, 21–24.
- Gemmell, H., Jacobson, B., Hayes, B., 2003. Effect of a topical herbal cream on osteoarthritis of the hand and knee: a pilot study. *J. Manipulative. Physiol. Ther.* 26, 15.
- Hsieh, L.L., Kuo, C.H., Yen, M.F., Chen, T.H., 2004. A randomized controlled clinical trial for low back pain treated by acupressure and physical therapy. *Prev. Med.* 39, 168–176.
- Kalichman, L., 2010. Massage therapy for fibromyalgia symptoms. *Rheumatol. Int.* 30, 1151–1157.
- Kong, L.J., Zhan, H.S., Cheng, Y.W., Yuan, W.A., Chen, B., Fang, M., 2013. Massage therapy for neck and shoulder pain: a systematic review and meta-analysis. *Evid. Based Complementary Altern. Med.* (Epub ahead of print).
- Lawle, S., Cameron, L., 2006. A randomized, controlled trial of massage therapy as a treatment for migraine. *Ann. Behavior. Med.* 32, 50–59.
- McNair, D., Lorr, M., Droppleman, L., 1971. POMS-profile of Mood States. Educational and Industrial Testing Services, San Diego, CA.
- Wang, H.L., Keck, J.F., 2004. Foot and hand massage as an intervention for postoperative pain. *Pain Manag. Nurs.* 5, 59–65.